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THERMOGRAPHIC METHOD TO INVESTIGATE CERAMIC POST INSULATORS USED IN 110 KV DISCONNECTING SWITCHES

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Abstract.

In this paper are presented two practical methods, used to investigate the functional state of Ceramic Cylindrical Post Insulators, which are incorporated in the 110 KV High Voltage Disconnecting Switches. During exploitation in the electric fields, some of these Ceramic Post Insulators are affected by cracks, very small in the first stage, but which may become more important and large, in time. Beside these, other defects like small cracks, pores, lack of material, thermic points etc are at the origin of Ceramic Cylindrical Post Insulators Damage.

In order to investigate their functional state, we may use two Thermographic Methods: The Active Method and The Passive Method.

1. Thermographic Method to Investigate Ceramic Post Insulators Functional State – Active Method.

Investigation of the Cylindric Ceramic Post Insulators Functional State by The Actve Method is possible in the Laboratory Stand presented in Fig. 1.1. which includes the following equipments:

Fig.1.1. Laboratory Stand:

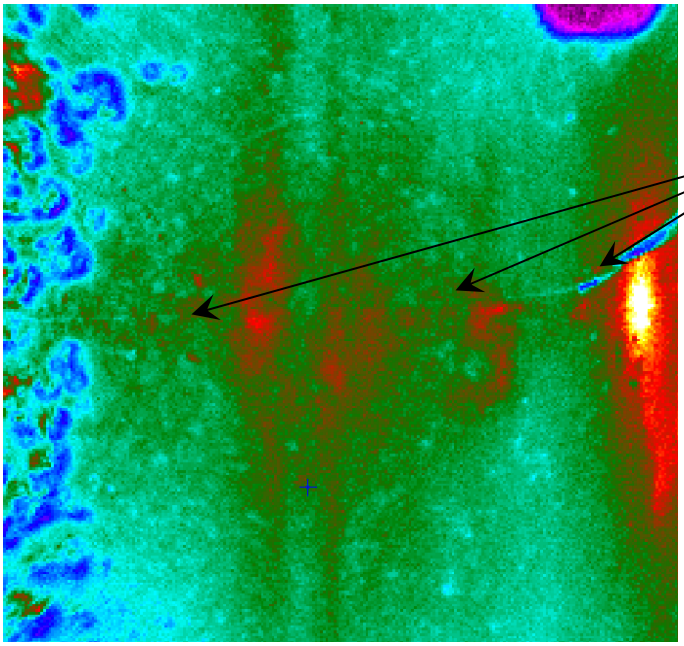
1.ThermoCAM PM 350 ; 2.Movable Support Table in 3 direction ; 3. Warm System by Electric Lamps ; 4. Camera Support ; 5. Energy Source.

As a result, o the laboratory investigation, concerning the Functional State of the selected Cylindrical Ceramic Post Insulators, used in the 110 KV High Voltage Disconnecting Switches, there have been found the followig categories:

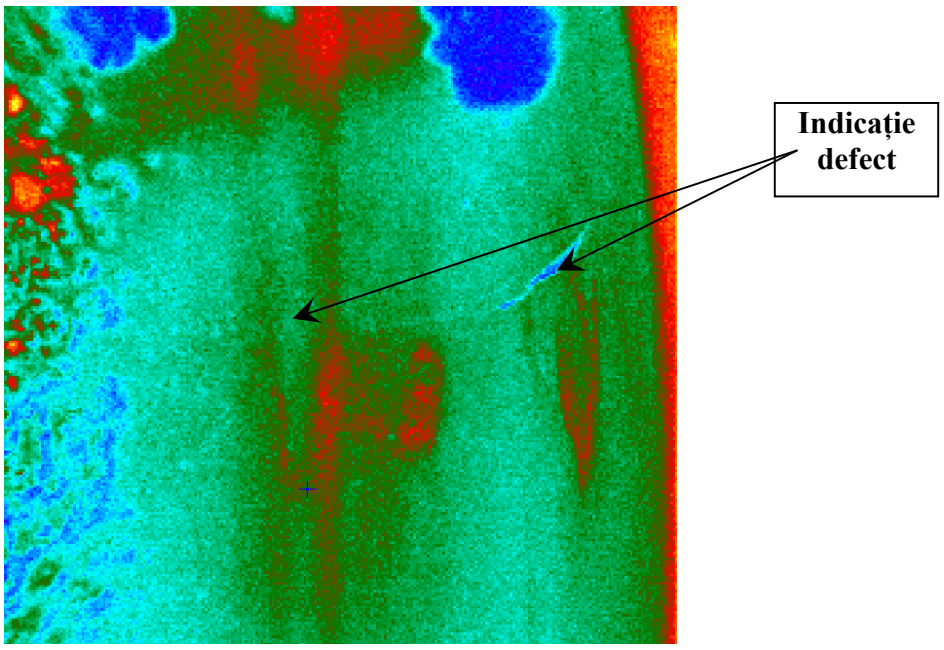
- Ceramic Post Insulators OK ;

- Ceramic Post Insulators containnig one or twe small cracks localized at the base of these, which can be maintained in use, but controlling the craks developing ;
- Ceramic Post Insulators containnig deadly defects, which must be taken off from use.

In Fig. 1.2 a) and b) are presented small and pretty large cracks in the Ceramic Post Insulator.



a



b

Fig. 1.2. Small and pretty large cracks

In Fig. 1.3. is presented a longitudinale crack in the body of Ceramic Insulator.

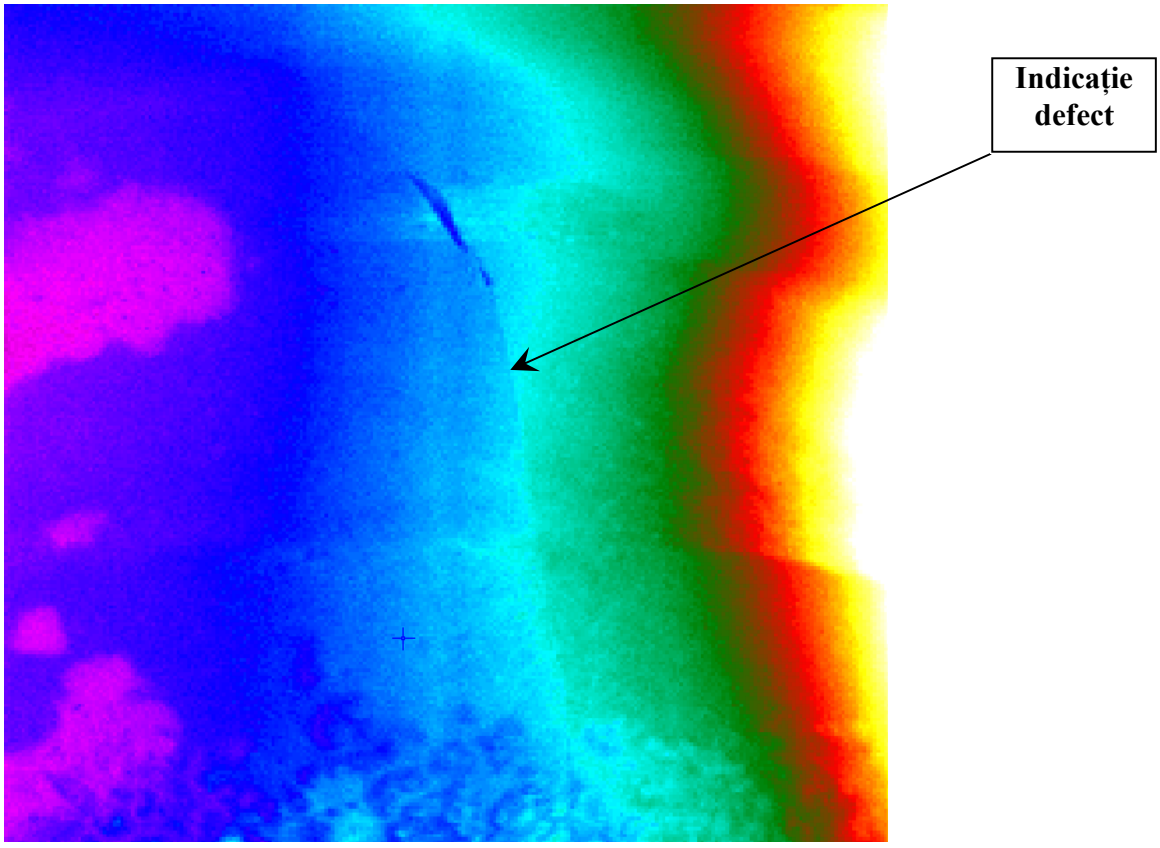


Fig. 1.3. Longitudinale Crack.

Conclusion.

Investigation of the Functional State of Ceramic Post Insulators by this Active Thermographic Method has some conclusions:

- Some of the investigated Ceramic Insulators presents original defects like: cracks, pores, lack of material, thermic points ;
- Thermic Points localized at the base of Insulator, may generate a „ V „ small slit, which in time, during exploitation, may penetrate through the material, to the surface ;
- During Investigation of the Ceramic Post Insulators, the Disconnecting Switcher must be off, the Function

2. Thermographic Method to Investigate Ceramic Post Insulators Functional State – Active Method.

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In the case of this method, we keep all the above specification, stating that , the equipment consist ,only in the Thermocamera THERMOCAM SC 640. This camera uses the inner warm of the ceramic material. The practical schema used in the electric fields, to investigate the Functional State of Ceramic Post Insulators, is presented in Fig. 2.1.

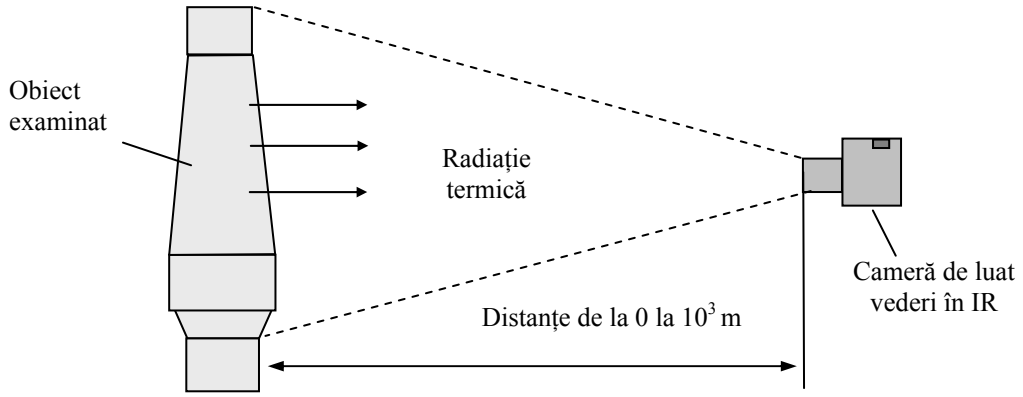

Fig. 2.1. Thermographic Method Scheme of Ceramic Post Insulators Investigation.

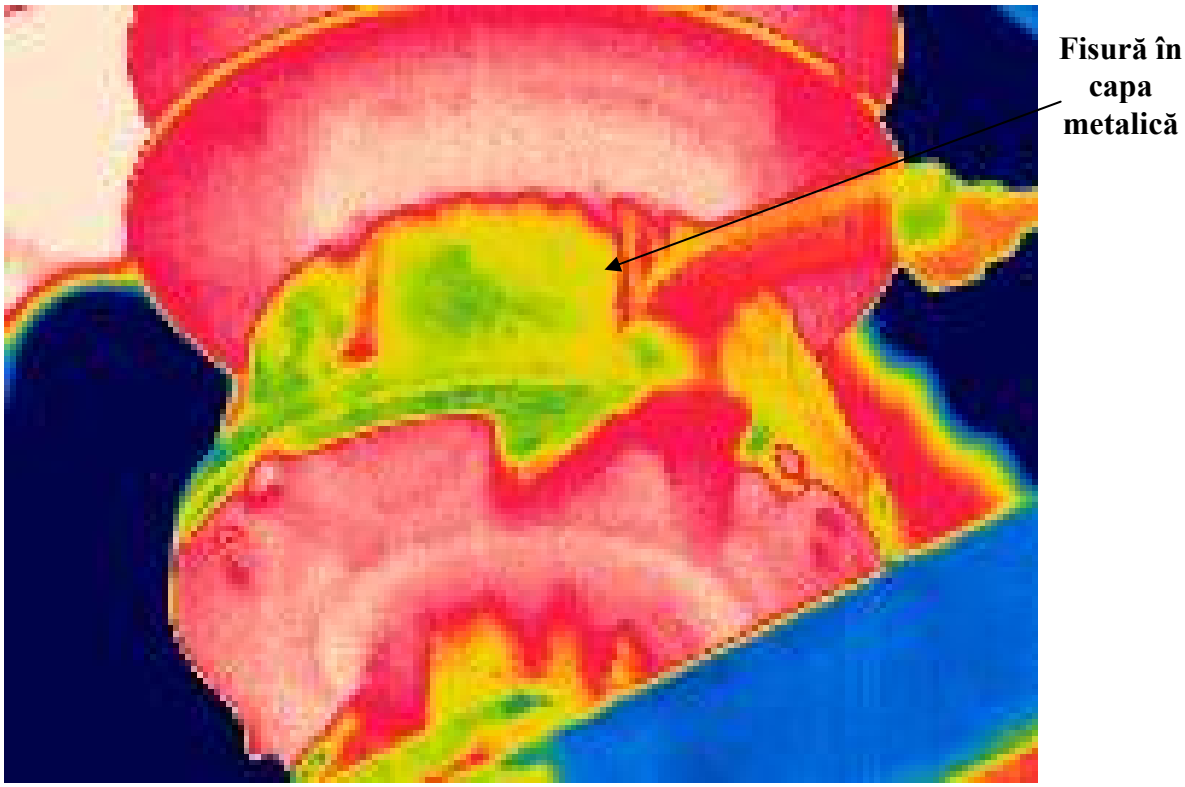

Fig. 2.2. Ceramic Insulator with a large Crack in Metallic Cup.

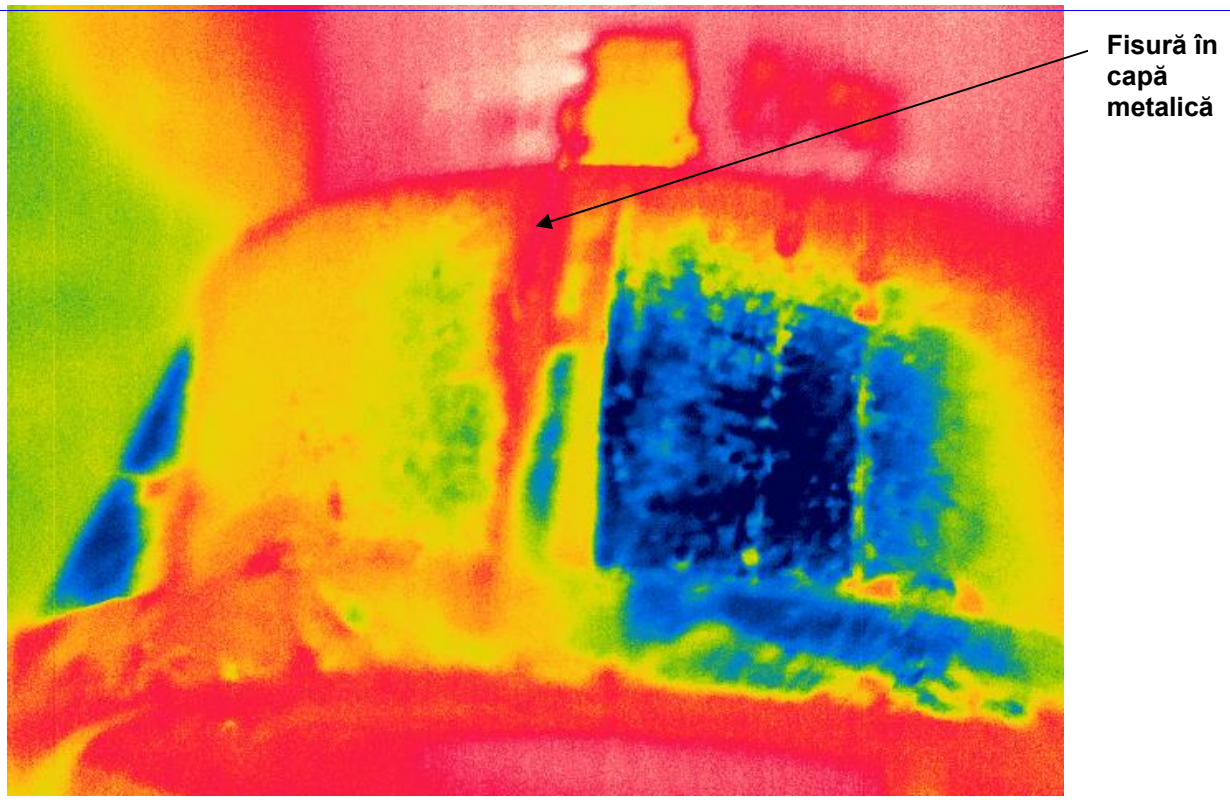

Fig. 2.3. Penetrated Crack to the Base of Metallic Cup.

By appling the Passive Method have been found , besides the usual defects presented before at the Actve Method, following kind of defects:
- Ceramic Insulators with a large crack in the Metallic Cup ;
- Penetrated Cracks to the Base of the Ceramic Insulator ;
- Small and large Cracks in the Ceramic Insulator Body., as they are shown in Fig. 2.4.

All these defects have been confirmed by direct and optical examination.

Conclusion.

The Passive Thermographic Method is appropriate to put in evidence the Ceramic Post Insulators Damages, by Direct Control, without taking off the funcion of the Disconnecting Switchers.

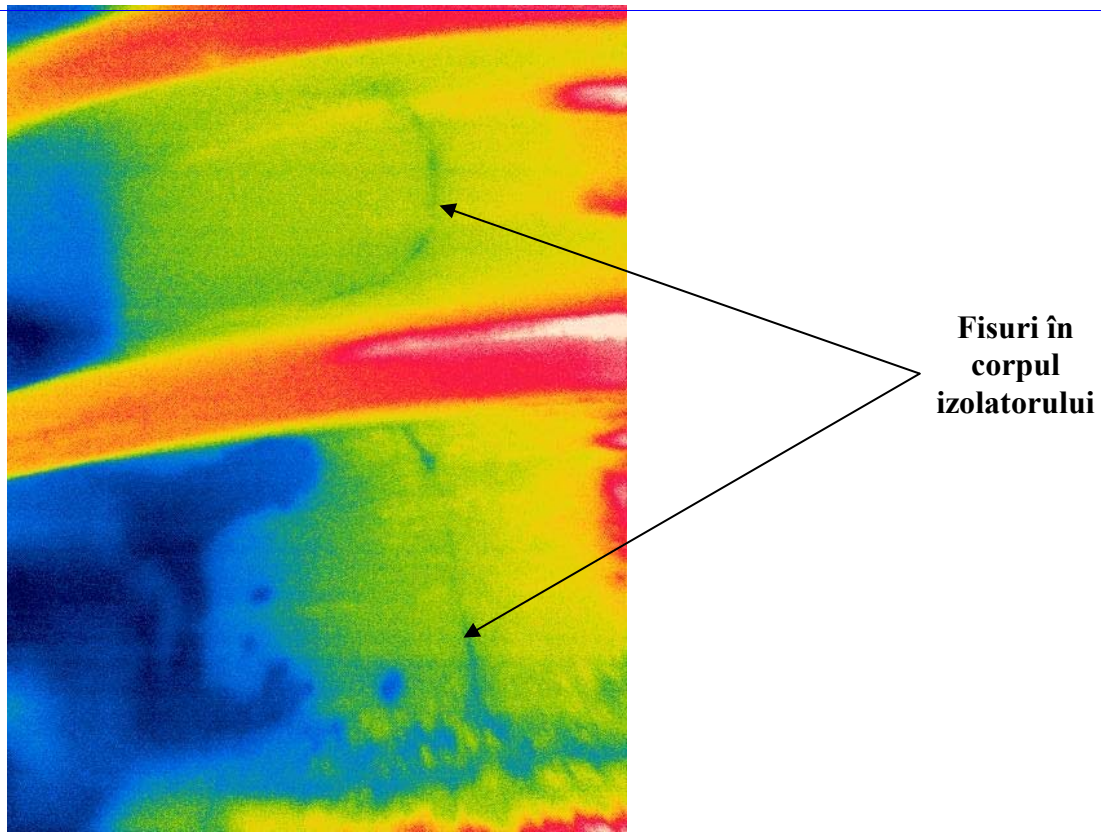

Fig. 2.4. Cracks in the Ceramic Insulator Body.

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